Raschi, A., Miglietta, F., Tognetti, R., van Garningen, P.R. (ed.): **Plant Responses to Elevated CO_2. Evidence from Natural Springs.** - Cambridge University Press, Cambridge - New York - Melbourne 1997. 272 pp. ISBN 0-521 58203 2 (hardback). GBP 40.00, USD 69.95.

The still increasing carbon dioxide concentration in the atmosphere associated with global climate change induced an urgent need of extensive environmental studies of this problem. Besides expensive, more or less short-term studies in growth cabinets, glasshouses, and open-top chambers, there is another possibility to expose plants in elevated CO_2 concentration—CO_2-emitting natural springs and other natural sources of natural CO_2. These provide a unique opportunity to study vegetation which has endured over many generations at naturally elevated concentrations of CO_2. Most of the work has since been conducted at sites with natural mineral springs, mainly for the reason that these locations have relatively low concentrations of atmospheric pollutants associated with the CO_2 emissions.

This book resulted from an international workshop on the Carbon Dioxide Springs and their Use in Biological Research, held on 14–17 October 1993 in San Miniato in Tuscany, central Italy. Forty-two authors, from France (2), Israel (1), Italy (19), Saudi Arabia (1), Spain (2), UK (10), and USA (7) presented 18 papers representing their findings and conclusions.

The papers are arranged roughly in 3 parts. The first part presents sites of naturally elevated CO_2 concentration, migration, leakage in the soil, and CO_2 emissions explaining case histories and hazards. Shortly, when photosynthesis on earth evolved, *ca.* 3.8 billion years ago, atmospheric CO_2 concentration ranged between 90 and 98 %, similar to the recent CO_2 concentration on lifeless planets Mars and Venus. This high CO_2 concentration originated from the outgassing of the earth's crust which continues today in volcanic regions. So, we can suppose that the ancient photosynthesis of ancient autotrophic organisms was adapted to the very high atmospheric CO_2 concentration.

The second part of papers summarised various possibilities of using natural sources of CO_2, *e.g.*, controlled degassing of lakes with high CO_2 content (gas-bearing lakes in Africa; CO_2 concentration up to 800 μmol mol^{-1}), or burning coal seams [southern Utah; carbon isotope ratio ($\delta^{13}C$), average CO_2 concentration 895 μmol(CO_2) mol^{-1}].

The third, extensive part of 11 chapters is devoted to methodology and research techniques, and opportunities of using different sources of natural CO_2. Majority of papers present results of measuring different processes, chemical composition, and photosynthetic traits in plants growing in vicinity of CO_2 springs in Italy (*Phragmites, Quercus*; up to 1250 μmol mol^{-1}; maximum leaf net photosynthetic rate (P_N), stomatal conductance (g_s), *etc.*). Further papers are devoted to studies of CO_2 springs (CO_2 concentration up to 1000 μmol mol^{-1}) in Iceland, Florida (USA), Catalonia (Spain), *etc.*, and also in tombs in Egypt, made on *Agrostidetum, Agrostis, Angelica, Boehmeria, Carex, Equisetum, Geranium, Hedera, Plantago, Quercus, Ranunculus, Scirpus, Triticum, Urtica, Viola, etc.* In general, rather irregular tendencies, mainly photosynthetic traits, were found in different plants. However, under elevated CO_2 concentration, small reduction was found in stomata density, leaf conductance for water vapour transfer (g_l) and specific leaf area; an increase was found in P_N, leaf water use efficiency, relative growth rate and specific leaf mass, *etc.* Leaf tannin concentration and isoprene emission were markedly increased, No change under elevated CO_2 concentration was found in P_N, maximum P_N, $\delta^{13}C$, g_l, chlorophyll *a* fluorescence (F_v/F_M, transpiration rate, nitrogen content, *etc.* No evidence was found of photosynthetic acclimation. Further papers deal with NH_4^+ assimilation in *Cyanidium,* decomposition processes in forest ecosystems and litter quality, and direct effect of CO_2 concentration on soil organisms, soil physical climate, *etc.* Interesting is also the paper called Can rising CO_2 alleviate oxidative risk for the plant cell? Unfortunately, finally the question has remained open, but the author presents interesting results on antioxidant analysis and chloroplast pigment degradation.

The book is provided with a plant and subject index which might have been prepared in more detail. The volume brings new insight into the studies of the effect of elevated CO_2 concentration. It may be useful for scientists and post-graduate students interested in the impact of global climate change on earth.

J. ČATSKÝ (*Praha*)